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ABSTRACT

A study was conducted to determine if a difference existed in the discrimination scores of normal hearing subjects when listening to pre-recorded male and female talkers. The talkers were, three females and three males, all native Southern Californians, to control dialectical differences. The listeners were eight females and eight males, aged 18 to 26. Results, at each of four sensation levels, showed that the sex of the listener caused a significant amount of variation in the discrimination scores. Listeners' performances, at each sensation level, also varied according to the sex of the talker. A paired difference t-test was used to eliminate the effect of listener variability in order to test for consistent differences related to the sex of the talkers. Results confirmed that normal hearing listeners show statistically significant differences in discrimination scores at specific sensation levels, depending on the sex of the talker. (MH)

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Effects of Talker's Sex on Discrimination Scores of Normal Hearing Listeners Using CID W-22 Word Lists

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The Effects of Talker's Sex on Discrimination Scores
of Normal Hearing Listeners Using
CID W-22 Word Lists

One major variable in speech discrimination testing has caused controversy over the years. This problem consists of whether to use monitored live-voice or recorded speech stimuli during testing procedures. Underlying this controversy is the assumption that talkers differ with respect to intelligibility. Critics of live-voice procedures argue that results obtained by different talkers cannot be compared, unless the talkers have been demonstrated to be equivalent. A point often ignored in use of pre-recorded material is that each talker's unique characteristics are permanently built into the test and one recording may differ from another, as much as two live-voice talkers.

Live-voice versus pre-recorded testing is in reality a minor aspect of the major dilemma of discrimination scores being affected by talker differences. Discrimination scores of normal and hearing-impaired individuals have been shown to vary statistically due to changes in talkers.

Differences in the intelligibility of a talker due to their sex were first noted in 1930 by Fletcher and Steinberg. Through the years, other studies have dealt with this question of intelligibility differences due to the talker's sex. Results of these studies have indicated that differences in discrimination scores of listeners were effected by the sex of the talker. To date, no research has dealt specifically with sex differences in talkers and listeners and its effect on discrimination scores during standard audiometric tests.

The question this study proposed to answer was as follows: Is there a difference in the discrimination scores of normal hearing subjects when listening to pre-recorded male and female talkers?

May I have SLIDE 1, please!!

Six adults, 3 females and 3 males served as talkers in this study. All talkers were born and raised in Southern California to control for dialectical differences. They ranged in age from 22 to 25 years.

Each talker recorded a randomized version of the CID W-22 monosyllabic word lists. Four lists of 50 monosyllabic words were recorded by each talker. The carrier phrase 'You will say,' was spoken before each word. The talker monitored this phrase by peaking each word at 0 on a VU meter. The monosyllabic ward was then spoken, as it would naturally follow in the phrase. A three second delay occured between each carrier phrase-word combination to allow listeners time to write down responses.

A quantifiable description of the vocal characteristics of each talker was desired; thus each talker recorded two randomized versions of the foloowing word list: heed, head, had, hod, hawed, hood, who'd, hud and heard. This was done in order to obtain a measure of their average fundamental frequencies and vowel formant frequencies. This was done to compare the results obtained from these talkers with the results obtained from Peterson and Barney, 1952. Results will be presented later.

Sixteen adults, 8 females and 8 males, served as listeners. All listeners were between the ages of 18 and 26 years. They all had normal hearing as tested by a screening procedure given prior to the actual study.

All stimuli were presented through a two channel research and diagnostic audiometer calibrated to ANSI-1969 standards. All stimuli were presented in a sound treated audiometric suite. Two listeners were tested at a time, 1 female and 1 male. Test stimuli were presented monaurally to the better ear of the listener. If both ears were the same, the test ear was randomly

selected. The lists were presented at 5, 10, 15 and 20 dB SL above SRT.

Word order, list order, talker order and sensation level order were randomized.

Discrimination scores were determined for each 50 word list. Each word was given a value of two per cent. A total of 24 scores was obtained for each listener.

MAY I HAVE SLIDE 2 PLEASE !!!

The results obtained from the spectrographic analyses performed on the 20 carrier phrase-h-vowel-d word combinations for each talker varied from the results obtained from Peterson and Barney. However, all the talkers in this study varied in the same manner.

As can be seen by this slide, the average fundamental frequencies for the male talkers differed by 24 Hz. Whereas, the average fundamental frequencies for the female talkers differed by 2 Hz, when comparing the two sets of female talkers.

MAY I HAVE SLIDE 3 PLEASE !!!

The values obtained for the three formant frequencies (F_1, F_2 and F_3) for each of the ten vowels for the six talkers were also compared to the Peterson and Barney data. Variation in the vowel formant frequencies for the two sets of talkers was noted. However, these variations occured in a consistent manner among the six talkers of this study.

Variation in the pronunciation of the two words 'hod' and 'hawed' occured between the two sets of takers. As can be seen, the vowels in these two words were not differentiated by the talkers in this study. A dialectical difference appeared to exsist between the two sets of talkers in the pronunciation of these words, as would be expected, since the talkers in the Peterson and Barney study were all Midwestern talkers, who distinguish between the two vowels. Whereas, the talkers in this study were all Southern Californians who do not differentiate between the vowels in 'hod'

and 'hawed.'

PLEASE REMOVE SLIDE #3.

Mean discrimination scores were obtained for the 8 male listeners and 8 female listeners for each talker and for sex of the talker at each of the four sensation levels.

MAY I HAVE SLIDE 4, PLEASE !!!

This slide shows how the discrimination scores varied depending upon the sex of the listener for all talkers. Female listeners consistently yielded lower discrimination scores than male listeners across all talkers. An analysis of variance performed at each of the four sensation levels showed that the sex of the listener caused a significant amount of variation in the discrimination scores of the listeners.

MAY I HAVE SLID 5! !!!

Listener's performances were also shown to vary depending upon the sex of the talker, as can be seen in this slide. The mean discrimination scores for all 16 listeners at each sensation level vaired depending upon the sex of the talker. At the 5 dB SL, the female talkers yielded a higher mean discrimination score than male talkers. However, this difference was not significant when a paired-difference t-test was performed. The mean discrimina on scores obtained at the 10, 15 and 20 dB SL yielded higher mean discrimination scores for male talkers than for female talkers. These differences were statistically significant at each of the three sensation levels 10, 15 and 20 dB.

A Paired difference t-test was performed on the data when results from a multiple regression analysis showed that across listener variability contributed more than any other dimension, except sensation level, to the over-all variability in discrimination scores. Therefore, a paired difference t-test was performed to eliminate the effect oflistener variability while testing for consistent differences related to sex of the

talker. That is, difference scores were calculated for on listener's performance to male and female talkers.

In summary, the paired difference t-test showed that at the 5 dB SL a non-significant difference was demonstrated for sex of the talker. However, at the 10, 15 and 20 dB sensation levels a significant difference was shown for sex of the talker.

The main question this study proposed to answer was: Is there a difference in the discrimination scores of normal hearing adults, when listening to male versus when listening to female talkers? The results of this study confirm that normal hearing listeners obtain statistically significant differences in their discrimination scores at specific sensation levels depending upon the sex of the talker.

PREPARATION

6 Talkers

3 Females
3 Males

PRESENTATION

16 Listeners

8 Females
8 Males

4 Conditions re: SRT

5 dB SL
10 dB SL
15 dB SL
20 dB SL

FUNDAMENTAL FREQUENCIES

Males

Peterson and Barney	132 Hz
Baurhenn	108 Hz

Females

Peterson and Barney	223 Hz
Baurhenn	221 Hz

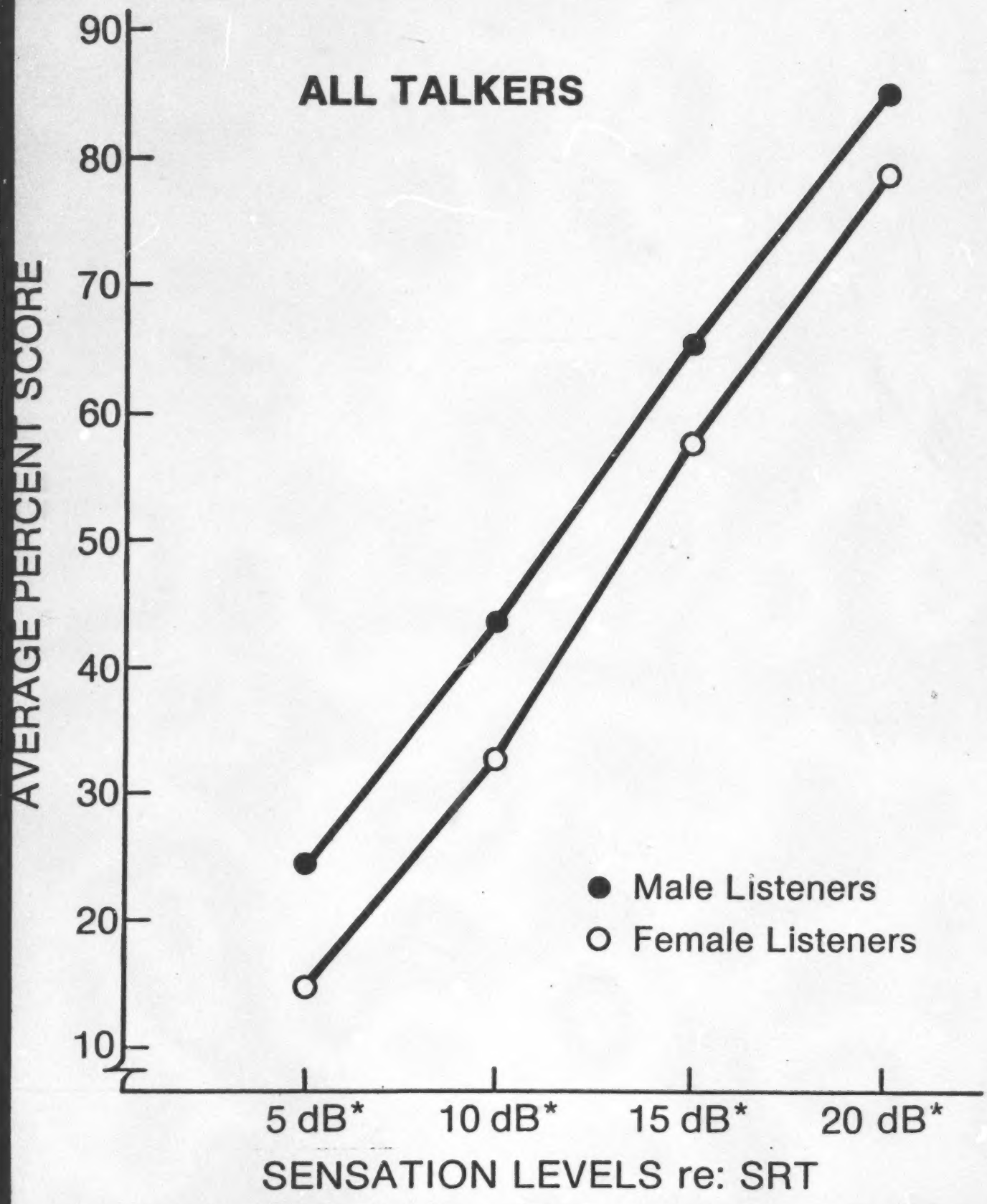
TALKER DIFFERENCES

Males

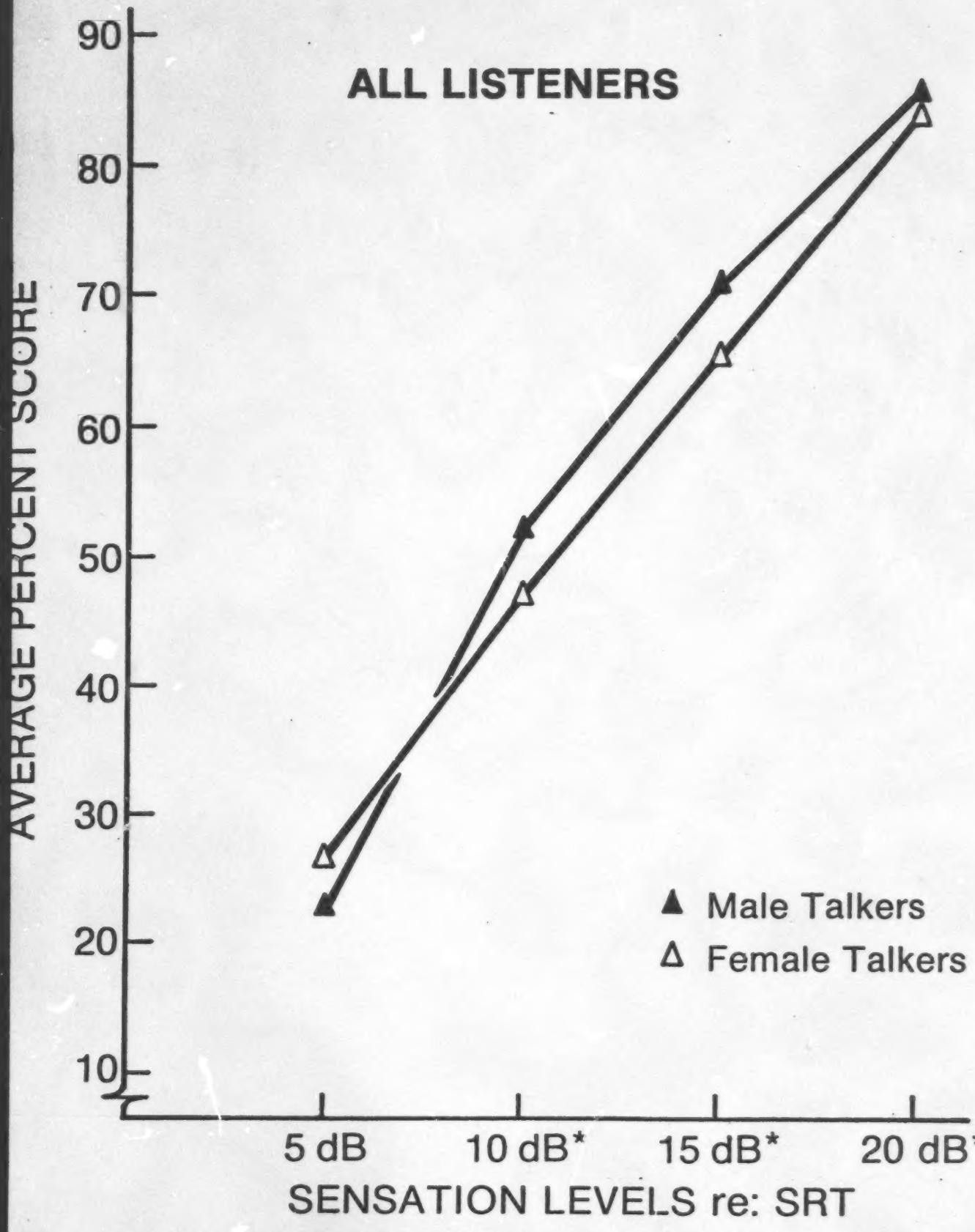
		F_1	F_2	F_3
Peterson and Barney	(ɑ-ɔ)	160	250	30
Baurhenn	(ɑ-ɔ)	70	-20	-40

Females

		F_1	F_2	F_3
Peterson and Barney	(ɑ-ɔ)	260	300	100
Baurhenn	(ɑ-ɔ)	90	100	50



*Statistically significant



*Statistically significant